

lines in this State; it makes the best cross-ties. No wood has been discovered that will stand the ravages of time and climate conditions as well as the Catalpa.

We have a Catalpa that is indigenous to this soil. A gentleman from DeLand was telling me yesterday that they have planted 60 acres and have good success with it. If our railroads in this State would realize the importance of the Catalpa tree, it would be adopted. The Illinois Central Railroad has planted 200 miles along the line of its roads.

Speaking of the destruction of our forests, if we stop to think that in the United States there are 200,000 miles of railroad, taking 24,000 cross-ties to every mile of road-bed; the average length of time these ties can be used is from six to seven years; with these figures we can realize how much wood it will require in this country.

One of the members of this Committee spoke of the profit of cutting down the forests, and although there may be profit in this work, I cannot agree with the Doctor. I really am very much impressed with the idea that this one question is of more real importance to the State of Florida than any other question that could come before the Legislature. I think that every effort should be made to preserve the forests and prevent the constant destruction of the forests in the State of Florida. If no tree would be cut down until it was grown, no forest cut over until it had reached maturity, the destruction of the young forests would be prevented. Mr. Pinchot, who is the head of the Forestry Department of the United States, is a man who is much impressed with the idea of the preservation of the forests of our country. He is a man who has given his time to this great work and will not receive a cent of pay for his services. During the last year or two he has sent several experts into our State with

a view of getting an accurate idea of the extent of the forests in Florida, and I am glad to say that these experts reported that the forests in this State were really better than in any other State in the country.

I wish to say in regard to the Catalpa, that the properties of that tree should be known by the people of Florida and more interest be taken in the planting and cultivation of this tree.

In regard to an exhibit to be made in St. Louis this summer by some Society interested in tree growth, it seems that this Society is to make an exhibition. Among other exhibits they are to show telegraph poles and railroad ties of the Catalpa which have been in use 32 years. The Catalpa tree seems adapted to the soil of Florida.

Dr. Richardson—I am in full sympathy with the report of the Committee and with forestry, but I still say that the cutting of wood is profitable. The yellow pine, I think, is a very fine kind of wood and it has its use, but I believe the Catalpa is so far superior to the pine that they cannot be spoken of in the same connection. The cultivation of these trees may, and probably will, be profitable.

#### ANTHRACNOSE ON THE POMELO.

*Mr. President, Ladies and Gentlemen:*

Attention was called to this disease in Bulletin 53, Florida Experiment Station, under the name, Leaf Spot, as at that time it was observed only upon the leaves.

#### DISTRIBUTION OF THE DISEASE.

During the past fruit season, 1903-1904, this new disease has appeared on pomelo fruit in a number of different sections of the State, and a careful examination of the fruit, both in the field and in the laboratory, has proved that this new disease is caused by the same fungus, *Colleotrichum gleosporioides* Penzig, as causes the leaf

spot. Early in the season it was observed in two or three different and widely separated groves in the eastern part of the State, and, a little later, diseased fruit was forwarded from West Florida. Later on, investigation of the fruit in a number of groves in the western part of the State showed that the disease was widely distributed in that section. Specimens of fruit were also received from a number of different points in the interior of the State. An examination of the pomelos held for sale by the fruiterers of Jacksonville, Florida, showed that the disease must have been quite prevalent throughout the State. It was almost impossible to find any considerable amount of fruit exposed on the fruit stands in which a few diseased specimens, at least, could not be found.

From these observations, we may safely conclude that the disease on the fruit is likely to occur in any portion of the State and that it is at the present time widely distributed, though, as pointed out later on, there appear to be certain conditions especially favorable to its development.

This disease on the fruit was first observed by the writer in the autumn of 1901, but attracted little attention at that time, as the damage was slight, only a few specimens of diseased fruit having been observed in a single grove. Since that time the disease in the grove where it was first observed has increased to such an extent that the trees, on which it was first noticed, yielded a very small proportion of sound fruit during the present season. The disease has probably been at work for a considerable length of time, and, as is usual in such cases, attracted little attention until it became serious. The loss during the past season in two or three instances has amounted to from five hundred to a thousand dollars in a single grove.

From our present knowledge of this disease, it appears to be on the increase,

and we are probably justified in predicting that it has not yet reached its worst. The disease is, in all likelihood, an introduced one, and it may be looked to attack the sweet orange in addition to the lemon, lime and pomelo. It frequently occurs upon leaves, twigs and branches of the sweet orange, and, on one occasion, sweet orange fruit on one of the fruit stands in Lake City, Florida, were observed, covered by lesions (diseased spots) caused by this same fungus, *Colletotrichum gleosporioides*.

#### THE DISEASE ON THE FRUIT.

The fruit may be attacked either on the tree or after it is removed. Specimens of rind, removed from fruit which had been shipped to Chicago, have been examined, on which the disease was present. It was said to have been perfectly sound at the time of shipment.

The most conspicuous damage, during the time the disease has been under observation, has been to the fruit while it still remained upon the tree. Upon the fruit, the presence of the disease is first manifested by an irregular, brownish discoloration. The discolored area is irregularly defined around the margin. The diseased spot may be on any portion of the fruit, and may vary from an inch or so in diameter to an area nearly equal to that of the outside of the fruit. As it progresses, these spots gradually change in color, sometimes becoming greyish, sometimes somewhat lighter. Ultimately, however, the whole affected area becomes dirty black in color. If the point of infection is small at first, it gradually enlarges, under favorable conditions, so as to embrace the whole fruit. Sometimes the affected area remains constant in size for a considerable time, in which case, in its older stage, it varies from black at the center through various shades of brown, brownish yellow

to the normal yellowish color of the healthy rind at the margin.

The black discoloration is caused by the formation of the spore bearing parts. These dark fruiting bodies are so numerous as to make the fruit black. Under a hand lens, they seem to be rather irregular in size and shape, and are elevated above the surface of the diseased rind. The outer ends of the oil cells are depressed, the depressions showing a wrinkled appearance. From these fruiting bodies sporules or spores are produced. They are very minute, measuring only from 16-18 by 4-6 microns.\* Under the microscope they are seen to be cylindrical, rounded at the ends and hyaline in color. They have but one cell. Frequently, minute, round, light colored areas may be made out in them.

The disease starts at the outside of the fruit and works inward as well as around it. The mycelium of the fungus seems to progress more rapidly toward the center of the fruit along the partitions or dividing septa than it does through the pulp; but it grows in both. The mycelium is branched and grows at will; first through the inner portion of the rind, later entering the fruit.

The disease is confined to the rind for a considerable period, and the flavor of that portion of the pulp immediately beneath the seat of infection is normal for sometime, while the opposite side of the fruit retains its normal quality for a much longer period. Ultimately, however, the flavor of the whole fruit is distinctly altered. The bitterness in the flavor is probably unchanged, but the acid and sugar in the juice are either broken down or destroyed. In consequence the bitter taste is very strong and being unmodified by either sweetness or acid, is quite disagreeable. Besides this, the juice and pulp are perme-

ated by the flavor of decay and emit the distinct odor of citric acid.

While fruits attacked by the disease usually present the appearance already described, at other times the trouble manifests itself by the appearance of a large number of circular or more or less irregular brown areas. The rind immediately beneath and surrounding these areas is depressed, but in the center the discolored spots are frequently somewhat elevated. They become more prominent as the rind dries, contracts, and becomes thinner. When placed in a moist chamber the disease soon embraces the whole fruit and the rind becomes very dark in color, owing to the large number of fruiting bodies of the fungus formed.

#### SUGGESTED CAUSES OF THE DISEASE.

It has been stated by growers that the disease was caused by spraying, by the effects of cold, or by the strong sunlight. While it must be recognized that any condition which reduces the vigor of the tree, or any part of it, acts as a predisposing cause, still the immediate cause of the disease is the fungus already referred to, and were this not present the disease would not occur. It has been found on sprayed and unsprayed trees, on fruit in the sun and in the shade. The fruit may be affected on any part, base or apex, on the side facing outward when hanging on the tree, or on the inner side. It has been found in sections where no fruit was touched by frost, though it frequently develops on frosted fruit. It has been found on fruit well up in the tops of the trees and on fruit borne on the lower branches and touching the ground. From these facts we must grant that neither spraying, frost, sun, shade, nor the position of the fruit on the tree has anything to do with the *cause* of the disease. It is probably true that the fruit near the ground, where the air is

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\*A micron equals 1-2500 of an inch.

moist and where the fruit is more shaded, may be more subject to the disease. Aside from this, the position of the fruit has no bearing on the virulence of the disease or in rendering the fruit more susceptible to attack.

#### CONDITIONS FAVORING THE DISEASE.

*Starved condition of the tree.*—In animal, so in vegetable life; the vigorous, well-fed individual withstands disease, while the weak, starved one succumbs. The pomelos are naturally vigorous growers, and we are probably not far astray when we say that, compared with sweet orange trees, of equal size and age, they require from one-fourth to one-third more fertilizer. In a number of instances poorly fed trees have been attacked on leaf, branch and fruit by the disease, while better nourished ones immediately adjoining showed no signs of its attack. The remedy in this case is obvious.

*Wind.*—Where trees have been badly whipped by the wind, causing abrasions on the fruit and branches and tearing the leaves, the disease adds to the injury already done. The wounded spots are very readily attacked. On the other hand, trees standing in still areas, where there is little or no air movement, are more subject to attack than are those about which the air circulates freely. The trees should not be subjected to the whipping force of the wind, neither should they be so hedged in or walled about by standing timber as to prevent a free circulation of air. In the matter of forest protection, the middle course should be pursued.

*Frost.*—The disease usually follows injury to the leaves, branches and fruit by frost. The spores of the fungus gain access to the tissues through the parts injured.

*Disease.*—Trees suffering from die-back, foot-rot, or any other disease are more sub-

ject to the attacks of Anthracnose than are those which are entirely healthy.

*Insects.*—These devitalize the trees and puncture the tissues, thus making it possible for the fungus to gain a foothold. Among those insects which appear to assist in increasing the attacks of the fungus may be mentioned, in particular, the different scales and mites.

*Bruises.*—The slightest abrasion of the surface of the fruit opens up a way for the entrance of the fungus. The greatest care should be exercised in handling the fruit to prevent injury to the rind.

#### REMEDIES.

*Removal of diseased fruit.*—All diseased fruit should be taken from the trees, and if any should have fallen to the ground, it, too, should be collected. Destroy all badly affected fruit; either bury it deeply or burn it. Fruit showing only slight effects of the disease may be sold in nearby markets.

*Pruning.*—Cut out and burn all dead and diseased branches. Rake up and burn all leaves lying about and under affected trees.

*Spraying.*—Trees on which diseased leaves and branches appear should be thoroughly sprayed with Bordeaux mixture early in the season (May, June, July). If spraying is needful and desirable as the fruit nears maturity, spray with ammoniacal solution of copper carbonate. Three or four applications at intervals of ten days may be necessary. Mr. E. P. Porcher, Cocoa, Fla., successfully combated this disease and stayed its progress by this means.

Fruit on which the disease is likely to be present should be sprayed after removal, so as to prevent its development on the way to market.

*Washing.*—Many growers wash their fruit before shipping it. Ammoniacal

solution of copper carbonate may be added to the water used in washing. Another good substance for this purpose would be potassium sulphide.

H. HAROLD HUME.

### DIE-BACK.

*Mr. President, Ladies and Gentlemen:*

As opinions are of value to the extent of experience only, I will have to confine myself to die-back.

*Cause:* Lowlands, containing either an excess of humic acid or iron, do cause some die-back; but, in the vicinity of St. Petersburg, this disease is nearly always caused by an excess of nitrogen, and especially from organic sources. Or we may otherwise state the case as a deficiency of potash and phosphoric acid, for with proper proportions of these mineral elements, a tree will, of course, use to an advantage a greater amount of nitrogen than when the mineral elements are deficient.

In my own grove, beggarweed has been the unmistakable cause of nearly all of the die-back that I have had, which has been sufficient to split and drop as much as eight hundred boxes of Tardiff oranges per year.

These bad results were realized even though every effort was made to balance the nitrogen secured by the beggarweed with potash and phosphoric acid. In short, after many years of foolish and costly effort to retain beggarweed in my grove, I found that the percentage of ammoniated and split oranges was just in proportion to the crop of beggarweed, a light crop doing but little damage, but a heavy crop of uncut beggarweed would ruin my crop of Tardiffs, in spite of all applications of potash and phosphoric acid. This damage was not done, as is often supposed, by the decay of the weed and the consequent release of nitrogen, but occurs during the

mid-summer months, before the weed is fully matured, and upon soil that was during the spring deficient in nitrogen.

From the above it seems reasonable to suppose that the damage is done by the rapid nitrification going on in the roots of the beggarweed, which in turn are mingled among the roots of the orange trees. Since killing out the beggarweed by mowing two or three times per year, the die-back has disappeared.

Have seen similar results in other groves, and think that the same objection may be raised to the other leguminoid plants, such as peas and velvet beans.

*Cure:* First, remove the cause. If land is sour, use hard-wood ashes or lime. If caused by an excess of ammonia, use only potash and phosphoric acid. Avoid beggarweed or other leguminoid plants. Allowing grass or oats to grow around the tree will remove the nitrogen rapidly.

Bordeaux mixture is highly beneficial, but often necessitates spraying for scale, by destroying the fungi that prey on the scale.

### INSECTS AFFECTING THE CITRUS TREES.

Purple scale, red spider, rust mites, green soldier and cotton bugs comprise our friends, the insect enemy of the citrus in our locality.

Excepting under abnormal conditions of growth, such as occurs after trees have been killed back, scale can be largely controlled by methods of culture, fertilizing, lady-bugs and fungi; but, when necessary to spray for them, the resin compound and resin wash is perhaps our most effective wash, but is injurious to the trees if used often.

Potash soap, while less effective, will, if used repeatedly, kill off the scale without injuring the tree. But during the past year I have used a caustic potash and sulphur combination that not only kills the